

CLAIMS

What is claimed as new and desired to be protected by Letters Patent of the United States is:

1. A method of creating a seal at a target anastomosis site in a blood vessel comprising the steps of:

providing a low profile shaft assembly having an expandable region and a sealing membrane spanning said expandable region, said expandable region being deployable from a first low-profile position to a second expanded position;

inserting said assembly into a blood vessel and positioning the expandable region at the target anastomosis site;

deploying said expandable region from said first low-profile position to said second expanded position; and

engaging the inner wall of the blood vessel at the target anastomosis site with the expandable region in its second expanded position to create a seal at the target anastomosis site.

2. A method of performing multiple anastomoses comprising the steps of:

providing a low profile shaft assembly having an expandable region and a sealing membrane spanning said expandable region, said expandable region being deployable from a first low-profile position to a second expanded position;

inserting said assembly into a blood vessel and positioning the expandable region at a first target anastomosis site;

deploying said expandable region from said first low-profile position to said second expanded position; and

engaging the inner wall of the blood vessel at the first target anastomosis site with the expandable region in its second expanded position to create a seal at the first target anastomosis site;

performing an anastomosis procedure at the sealed first target anastomosis site;

positioning the expandable region at a second target anastomosis site;

engaging the inner wall of the blood vessel at the second target anastomosis site with the expandable region in its second expanded position to create a seal at the second target anastomosis site; and

performing an anastomosis procedure at the sealed second target anastomosis site.

3. A method of performing multiple anastomoses comprising the steps of:
providing a sealing member deployable from a first low-profile position to a second expanded position;
inserting said sealing member into a blood vessel and deploying said sealing member from said first low-profile position to said second expanded position; and
engaging the inner wall of the blood vessel at a desired location with the sealing member in its second expanded position to create a seal, the sealed area of the blood vessel being large enough to accommodate multiple anastomoses; and
performing multiple anastomoses at the sealed area.

4. The method of claim 3 wherein the deployment of the sealing member is remotely actuated.

5. The method of claim 3 wherein said sealing member further comprises a low profile shaft assembly having an expandable region and a sealing membrane spanning said expandable region.

6. A device for creating a seal in a blood vessel comprising:
a low profile shaft assembly configured for insertion into a vessel, said shaft assembly having an expandable region at the distal end of the shaft assembly and a sealing membrane spanning said expandable region, said expandable region being deployable from a first low-profile position to a second expanded position and having an area in its second expanded position corresponding to an area of a blood vessel that is large enough to accommodate multiple anastomosis sites; and

a clamping member positioned generally opposite to and moveable towards said expanding region, said clamping member having a distal end shape corresponding to said expanding region in its second expanded position.

7. The device of claim 6 wherein said expandable region in its second expanded position has an elongated hexagonal shape.

8. The device of claim 6 wherein said expandable region in its second expanded position has an elongated octagonal shape.

9. The device of claim 6 wherein said expandable region in its second expanded position has an oval shape.

10. The device of claim 6 wherein said expandable region in its second expanded position has a circular shape.

11. The device of claim 6 wherein said expandable region further comprises segments that bow outwardly from the shaft assembly when the expandable region is deployed from said first low-profile position to said second expanded position.

12. The device of claim 6 wherein at least two of the bowing segments are biased toward the clamping member when the expandable region is deployed from said first low-profile position to said second expanded position.

13. The device of claim 11 wherein said bowing segments are formed of a slitted flexible tube.

14. The device of claim 11 wherein said bowing segments are formed of a super-elastic metal memory.

15. The device of claim 6 wherein the sealing membrane is reinforced.

16. The device of claim 6 further comprises a protective shield that is deployable over at least a portion of the expandable region in its second expanded position.

17. The device of claim 6 wherein the shaft assembly further comprises a slide operably linked to said expandable region such that translational movement of the slide from a first to a second position deploys said expandable region from said first low-profile position to said second expanded position.

18. The device of claim 17 wherein translational movement of the slide can be remotely actuated.

19. The device of claim 6 wherein the shaft assembly further comprises a deployment tube moveable in relationship to the expandable region such that translational movement of the deployment tube from a first to a second position deploys said expandable region from said first low-profile position to said second expanded position.

20. The device of claim 19 wherein translational movement of the deployment tube can be remotely actuated.

21. A device for creating a seal in a blood vessel comprising:
a low profile shaft assembly configured for insertion into a vessel, said shaft assembly having an expandable region at the distal end of the shaft assembly and a sealing membrane spanning said expandable region, said expandable region being deployable from a first low-profile position to a second expanded position and having a hexagonal configuration in its second expanded position; and

a clamping member positioned generally opposite to and moveable towards said expanding region, said clamping member having a distal end shape corresponding to said expanding region in its second expanded position.

22. A device for creating a seal in a blood vessel comprising:
a low profile shaft assembly configured for insertion into a vessel, said shaft assembly having an expandable region at the distal end of the shaft assembly and a sealing membrane spanning said expandable region, said expandable region being deployable from a first low-profile position to a second expanded position and having an octagonal configuration in its second expanded position; and

a clamping member positioned generally opposite to and moveable towards said expanding region, said clamping member having a distal end shape corresponding to said expanding region in its second expanded position.

23. A device for creating a seal in a blood vessel comprising:

a low profile shaft assembly configured for insertion into a vessel, said shaft assembly having an expandable region at the distal end of the shaft assembly and a sealing membrane spanning said expandable region, said expandable region being deployable from a first low-profile position to a second expanded position and having a circular configuration in its second expanded position; and

a clamping member positioned generally opposite to and moveable towards said expanding region, said clamping member having a distal end shape corresponding to said expanding region in its second expanded position.

24. A device for creating a seal in a blood vessel comprising:

a low profile shaft assembly configured for insertion into a vessel, said shaft assembly having an expandable region at the distal end of the shaft assembly and a sealing membrane spanning said expandable region, said expandable region being deployable from a first low-profile position to a second expanded position, the expandable region in its second expanded position having a cup-shaped configuration; and

a clamping member positioned generally opposite to and moveable towards said expanding region, said clamping member having a distal end shape corresponding to the rim portion of the cup-shaped configuration of said expandable region in its second expanded position.

25. The device of claim 24 wherein said expandable region further comprises segments that bow outwardly from the shaft assembly when the expandable region is deployed from said first low-profile position to said second expanded position.

26. The device of claim 25 wherein at least two of the bowing segments are biased toward the clamping member when the expandable region is deployed from said first low-profile position to said second expanded position.

27. The device of claim 25 wherein said bowing segments are formed of a slitted flexible tube.

28. The device of claim 25 wherein said bowing segments are formed of a super-elastic metal memory.

29. The device of claim 24 wherein the sealing membrane is reinforced.

30. The device of claim 24 further comprises a protective shield that is deployable over at least a portion of the expandable region in its second expanded position.

31. The device of claim 24 wherein the shaft assembly further comprises a slide operably linked to said expandable region such that translational movement of the slide from a first to a second position deploys said expandable region from said first low-profile position to said second expanded position.

32. The device of claim 31 wherein translational movement of the slide can be remotely actuated.

33. The device of claim 24 wherein the shaft assembly further comprises a deployment tube moveable in relationship to the expandable region such that a slide operably linked to said expandable region such that translational movement of the deployment tube from a first to a second position deploys said expandable region from said first low-profile position to said second expanded position.

34. The device of claim 33 wherein translational movement of the deployment tube can be remotely actuated.

35. A device for creating a seal in a blood vessel comprising:

a low profile shaft assembly configured for insertion into a vessel, said shaft assembly having an expandable region at the distal end of the shaft assembly and a sealing membrane spanning said expandable region, said expandable region being deployable from a first low-profile position to a second expanded position; and

a clamping member positioned generally opposite to and moveable towards said expanding region, said clamping member having a distal end shape corresponding to said expanding region in its second expanded position,

wherein said shaft assembly expandable region further comprises segments that bow outwardly from the shaft assembly and are bias toward the clamping member when the

expandable region is deployed from said first low-profile position to said second expanded position.

36. The device of claim 35 wherein said bowing segments are formed of a slitted flexible tube.

37. The device of claim 35 wherein said bowing segments are formed of a super-elastic metal memory.